Ohio Agricultural Experiment Station

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COOPERATIVE TESTS WITH SOYBEANS IN 1912

C. G. WILLIAMS AND F. A. WELTON

In the spring of 1912 the Station distributed a quantity of soybeans. In general the plan followed was two-fold: To farmers who wished to make a comparison of varieties and who were willing to make out and return a brief report of same, the Station furnished free seed of a few of its most promising varieties for a test in small plots (size, two to four square rods). To those who wished to experiment with the crop, but who did not care to conduct a variety test, the Station sold beans in lots not to exceed one bushel. With one exception, all the seed sold was of the Medium Green variety.

Thirty-two cooperators, representing twenty-one counties, have submitted reports, a brief summary of which is here presented. For the most part the farmers reporting were without experience in growing soybeans. The results are both interesting and, in the main, encouraging. All the reports the Station received are included, without regard to their success or failure.

The reports are here arranged in alphabetical order according to counties.

ALLEN

Mr. C. W. Breese planted 1 bushel of soybeans May 20, using a common grain drill, stopping up all but two hoes. The seed did not germinate very well. He cultivated the beans three times; cut

them with a mowing machine, fitted out with a clover buncher, and after curing them two weeks threshed 19 bushels. The beans shattered badly, about one-fourth of the crop being lost in harvesting.

ASHTABULA

Mr. Frank A. Stillman planted beans about the first of June. They came up slowly, due to two weeks of dry weather immediately after planting. They grew vigorously through the summer and looked fine, but were caught by frost October 1. In a few days more they would have matured a large crop of seed.

Mr. Clinton D. Hatton reports an uneven stand due to a rain shortly after planting which formed a crust and prevented the beans from coming up. The crop was cut and fed directly to dairy cows and consumed with relish.

BELMONT

Mr. A. M. Simpson, who conducted a variety test, submits the following report:

TABLE I: Variety test of A. M. Simpson. Date of planting, June 1

Plot No.	Variety	Date of bloom	Yield per acre Bus.	Retention of beans
1	Ohio 9035	8-2	12.33	Good
2	Ohio 7406	7-28	9.66	Fair
3	Medium Green	7-30	8.00	Fair
4	Ito San	7-20	8.33	Good
5	Ebony	7-24	7.33	Good
6	Sable	....	9.33	Good

Mr. Simpson states that the plants were grown in a field where soybeans had never been grown before, yet a few nodules were found in Plots 1 and 2. The Ito San was very small. The Sable seemed larger than any of the others, although the first three (Ohio 9035, Ohio 7406 and Medium Green) evidently made better growth until date of bloom.

CHAMPAIGN

Mr. Chas. B. Wing, of the Wing Seed Co., who included a few of the Station's selections in their extensive variety test, writes as follows:

"Replying to yours of Jan. 6, our test plot work this year was almost a total failure, and not worth reporting."

Mr. L. E. Thatcher, who conducted a variety test, submits the following report:

TABLE II: Variety test of L. E. Thatcher. Date of planting, June 1

Plot No.	Variety	Average height of plants	Date of maturity	Yield per acre	
				Beans Bus.	Straw Lbs.
1	Ito San	30	9-14	22.00	2,080
2	Ohio 7406	34	24	20.00	1,600
3	Medium Green	34	20	16.00	1,280
4	Ebony	36	12	18.66	1,760
5	Ohio 7476	32	30	16.00	1,200
6	Ohio 9035	32	10-10	20.00	2,240
7	Ohio 7490	30	10	12.00	1,120
8	Medium Green	34	9-21	15.33	1,200
9	Mongol	34	24	24.00	2,080
10	New Era Cowpeas	..	....	.....	.....

Mr. Thatcher writes: The soil is a loose, black loam, well supplied with carbonate of lime in the form of small shells.

The varieties were drilled June 1 with a "Planet Junior" garden drill. This implement was not altogether satisfactory, owing to the difficulty in adjusting rate of seeding to suit different sized seed and to the splitting of some beans by the force feed.

The soil being loose the plants came up without difficulty. They were cultivated three times with a corn cultivator and hoed once.

The rabbits were very fond of Ohio 7490 and almost destroyed the young plants, but they did no damage to the other varieties. This, no doubt, accounts for the poor yield of this variety—12 bushels per acre.

Although soybeans had never been grown on this ground before, the roots of all varieties were well supplied with nodules.

The cowpeas were a total failure. Early in the season they were slightly injured by a light frost and from this shock they never recovered.

CLINTON

Mr. Willis L. Crites conducted a small but unsuccessful fertilizer test with soybeans. They were planted June 7. The planting was followed by cool, heavy rains, which resulted in a very thin and uneven stand. Soil was inoculated but he was unable to find any nodules in the fall. Owing to a delay at harvest, and three weeks of dry weather, a large percentage of the beans were finally lost through shattering.

COLUMBIANA

Mr. S. L. Powell reports a fine growth, plants standing two feet high, but pods were too low to cut with ordinary tools; accordingly the beans were pulled. He harvested 8 bushels from 3-8 bushel of seed.

DELAWARE

Dr. H. P. Miller reports as follows:

"The one bushel of Medium Green soybeans which I purchased from the Station was sown beside others of the same variety and harvested with them, so I have no data upon the product of that one bushel."

FAYETTE

Mr. A. S. Booco makes the following report of a variety test conducted by him:

TABLE III: Variety test of A. S. Booco. Date of planting, June 17

Plot No.	Variety	Source of seed	Average height of plants	Date of maturity	Yield per acre	
					Beans Bus.	Straw Lbs.
1	Hollybrook	Self	33	10-4	46.60	5,786
2	Medium Green	"	27	1	34.20	3,546
3	Shingto	Experiment Station	33	6	46 60	4,666
4	Taha	" "	34	12	46.60	5,039
5	Chestnut	" "	34	6	31.10	4,471
6	Ohio 9035	" "	31	12	51 30	7,746
7	Sable	Wings, Ohio	32	10	37.30	5,226
8	Jet	" "	39	12	32.40	7,019
9	Mongol	" "	33	6	38.80	4,014
10	Mikado	" "	29	15	40.40	3,910
11	Ito San	" "	34	6	29.50	2,706
12	Brown*	Woods, Va.	37	..	. ..	27,629
13	Black	" "	33	12	40 40	3,546
14	Mammoth Yellow*	" "	38	..	.....	23,149
15	Early Yellow	McQueen, Ohio	28	6	31.10	3,359
16	Nigger	" "	32	10	43.50	4,471
17	Select Green	" "	26	1	42.00	3,824
18	Ohio Yellow	" "	23	4	24 80	2,613
19	Banner	" "	33	4	43 50	5,972
20	Black Beauty	" "	32	12	43.50	3,733
21	Yellow*	Scarff, Ohio	32	..	.....	22,766
22	Mammoth Yellow*	Roney, Tenn.	36	..	.....	22,776

* Green weight. Cut for hay.

Mr. Booco makes the following observations regarding these varieties:

"Plots 1, 9 and 19 seemed to be the same.

Plot 17 appeared to be more vigorous than Plot 2, but otherwise the same.

Plots 7 and 16 were the same except in name.

Plots 8, 13 and 20 grew somewhat alike but were evidently different varieties.

Plots 11 and 15 could easily have been the same variety.

Plot 14 had some variety of yellow mixed with it, which ripened.

Plots 21 and 22 were alike."

Concerning his methods of culture, Mr. Booco writes as follows:

"I begin with a clean seed bed and sow with a twelve-hoed drill, dropping the seed from every third hoe, thus making the rows twenty-one inches apart. I follow at once with a weeder and, as soon as the beans are up and have developed a pair of leaves, I continue the use of this implement. In 1912 I cultivated with the weeder only twice after the beans were up. I have a riding weeder (the Keystone) which has small, diamond-shaped, detachable shovels, and with this I drive the same direction as I drilled the beans, removing the shovels from those teeth only which follow the rows.

At harvest, I wait till a few of the pods snap, then I cut at once, using a self-rake, leaving the beans in bunches like clover. After cutting I thresh immediately, using an ordinary separator with blank concaves. In this way but few beans are cracked.

I sack the beans and store them in a shed, placing the sacks in such a way that air may circulate freely around them. After two or three days I turn the sacks bottom end up, and in this way they dry out in fine shape.

The thirty acres I sowed in 1912 yielded at the rate of 20 bushels per acre, and this, too, on land twenty acres of which were so poor that they would only raise about 25 bushels of corn per acre. The other ten acres were fertile enough to yield 65 bushels per acre.

I inoculated a strip through the field, crossing both the rich and poor land. In the rich soil an abundance of nodules developed but in the poor soil only a very few were found. In the uninoculated soil none were found.

You will be surprised at the enormous yields; they show to me what is possible on rich land. They were grown on rich bottom land that made a yield of a little better than 100 bushels of corn per acre.

The more I learn about soybeans the more I think they are the thing."

FULTON

Mr. C. B. McLain planted 1 bushel of seed on 1¼ acre June 12, in rows twenty-eight inches apart, using a grain disk drill. Used weeder before the beans came up and gave three cultivations afterwards. The beans grew to a height of twenty-four to twenty-eight inches. Harvested them with a mowing machine with side-delivery attachment. Used a common thresher with concaves removed. Ran at low speed, yet many beans were split. Yield, 28 bushels per acre. Probably 5 bushels were left on the ground as a result of shattering.

HURON

Mr. Eugene S. Fish planted one bushel of seed on 1.69 acre of "very poor land," June 21. He did not inoculate and was unable to find any nodules. Total crop harvested, 19.23 bushels. The machine cleaned them well but cracked a great many beans.

Mr. W. A. Robinson reports the crop a failure for him, chiefly on account of the cold, wet summer.

Mr. Fred W. Knoll also reports a failure, stating that not more than one-tenth of the seed germinated. He replanted the greater part of the acre to millet but from the 1-5 acre left in soybeans he harvested 4 bushels.

Mr. J. M. Whitney planted 1 bushel of seed on 1½ acre May 27, using a corn drill adjusted to rows forty-two inches apart and dropping beans seven inches apart in row. Beans stood waist high and nearly filled the space between rows. Did not inoculate and found but a few nodules. The yield was 24 bushels per acre, with nearly 6 bushels (estimated) left on ground which hogs gathered without loss.

Mr. Whitney reports an increase in milk production from feeding soybeans with corn and oats, and that "sheep eat the threshed straw clean." He plans to plant the rows closer next season.

MADISON

Mr. Frank A. Thomas planted ½ bushel of seed on ½ acre, using a grain drill and closing all but three hoes. He inoculated the soil and found an abundance of nodules—some as large as hazelnuts. Yield, 26 bushels per acre with many lost from shattering as a result of beans being over-ripe when cut. Would prefer a variety which shatters less.

MEDINA

Mr. Warner Rowe conducted a variety test and submits the following report with the comment that the cowpeas "failed to mature":

TABLE IV: Variety test of Warner Rowe. Date of planting, June 10

Plot No.	Variety	Source of seed	Average height of plants	Date of maturity	Retention of beans	Yield per acre Bus.
1	Ebony	Experiment Station	30	10-6	Good	13.60
2	Ohio 9035	" "	30	10	Good	11.40
3	Ito San	" "	24	9-28	Good	12.60
4	Ito San	Self	24	10-1	Good	7.30
5	Ohio 7406	Experiment Station	24	6	Good	8.80
6	Medium Green	" "	30	10	Poor	8.80
7	Brown	Self	24	1	Good	10.10
8	New Era Cowpeas	Experiment Station	..	...	.....	... .

PERRY

Mr. John H. Faires planted his beans on bottom ground. They looked well until they were covered with over-flow water. Several recurrences of this condition during the season resulted in the destruction of nearly all the plants. The few which survived were harvested and satisfactorily utilized as feed.

RICHLAND

The test of Mr. John Chishold did not turn out well. He accounts for it on the ground that neither season nor soil were well suited to soybeans. The stand was poor, due in part to poor germination of seed, and, in part, to the fact that many seeds, on account of their size, were crushed in the operation of drilling.

SENECA

Mr. J. H. Creeger planted 1 bushel of soybeans the last week of May and harvested therefrom 30 bushels.

TUSCARAWAS

The beans in the variety test of Mr. O. J. Deibel were nearly all washed out by a hard rain. However, by taking care of what were left it was possible to get as much seed as was planted. He intends to try them again next year.

WARREN

Mr. H. A. Millard planted 1 bushel of seed on ¾ acre, in rows thirty-two inches apart. Soil, an upland clay. Has had no green manuring and but one stand of clover in twelve years. No manure or commercial fertilizer was used. No inoculation, yet a few nodules were found in the fall. Yield, about 10 bushels per acre. Lost fully one-third of the beans.

Mr. D. Ellis submits the following report with the comment that he did not inoculate the soil:

TABLE V: Variety test of D. Ellis

Plot No.	Variety	Yield per acre Bus.
1	New Era Cowpeas	2.13
2	Ohio 9035	6.66
3	Medium Green	5.60
4	Ito San	7.00
5	Ohio 7406	6.40
6	Ebony	9.33

WASHINGTON

Mr. W. H. Bell planted soybeans about June 14. Part were drilled solid, and part in rows thirty-eight inches apart. On account of cold, wet weather in early part of the season, the beans made slow growth and the weeds gained considerable headway. Those drilled in rows were cut for seed; the others for hay. The latter were fed to horses and cattle, both of which ate them clean. "I am going to try them again next year."

WAYNE

Mr. D. B. Keck reports a yield of 22 bushels of very nice beans from the bushel of seed used. "Will plant more this coming year."

Mr. Theodore Musser planted 1 bushel on ½ acre, drilling them solid. Had expected to cut them green for cow feed but as they did not relish them he left the beans for seed. Harvested about 2 bushels.

Mr. E. B. Zimmerman planted 1 bushel on about 1½ acre. Rows twenty-eight inches apart. Planted them deep and just before a heavy rain. Result, a poor stand. Worked them twice with a

weeder and once with two-horse cultivator. Cut them with a mowing machine. Rainy weather prevented threshing until many had shelled out. Yield, 14 bushels per acre. "I intend to plant some again next year."

Mr. Asa Workman planted 1 bushel on 1¾ acre the last of May on ground manured before plowing. Worked them twice with a weeder and three times with a cultivator, yet the field became grassy. Did not inoculate and was unable to find nodules on roots. Cut beans with a mower and raked with horse rake. Yield, 20.50 bushels per acre, machine measure. "Am planning to sow 4 acres next year."

Mr. O. H. Wertenberger planted 1 bushel on 1¼ acre. Used 150 pounds per acre of a 14 percent acid phosphate, drilling it solid. Drilled beans in rows thirty-two inches apart. Thinks every bean grew. One-tenth of the field was injured by water. Did not inoculate. Found no nodules. Land irregular, causing beans to ripen unevenly. On this account and also on account of their lying in field during three or four weeks of dry weather, they shelled considerably. Threshed them with a grain separator, using blank concaves, yet many beans were cracked. Total yield, 12.80 bushels per acre. "I expect to sow a larger acreage next year."

WILLIAMS

Mr. W. S. Tomlinson planted soybeans in corn, both crops to be used for silage. The corn (Leaming) was checked, and as soon as the rows could be followed, was dragged and cross plowed, then a hill of soybeans was planted between the hills of corn, using hand planters. After planting the beans, the corn could be worked one way only, but no trouble was had with weeds.

Where the corn was of moderate growth (40 to 50 bus. per acre) the beans were a success, but where the corn grew large the beans did not amount to much. The poorer the corn, the better the beans.

Mr. Elmer S. Johnson submits the following report of a variety test:

TABLE VI: Variety test of Elmer S. Johnson. Date of planting, May 30

Plot No.	Variety	Average height of plants	Date of maturity	Yield per acre	
				Beans Bus.	Straw Lbs.
1	Ito San	30	9-1	27.35	2,461
2	Ohio 7406	29	20	35.39	3,942
3	Medium Green	34	3	35.53	3,636
4	Ebony	28	10	24.50	2,164
5	Ohio 7476*	32	27	29.50	3,826
6	Ohio 9035*	32	10-3	34.50	4,340
7	Ohio 7490	40	5	30.50	3,634
8	Medium Green	34	9-3	32.50	3,510
9	Mongol	38	10-7	30.27	2,302
10	New Era Cowpeas	..	....	.....	.....

* Yield reduced slightly by nearby trees.

Mr. Johnson planted the beans in rows twenty-one inches apart on land from which had been harvested in the past three years two crops of corn and one of sugar beets. He cultivated with beet plow and threshed them by placing belt wheel on cylinder shaft of manure spreader and connecting same to gasoline engine.

The plot of cowpeas was a total failure.

WYANDOT

Mr. C. M. Wenner planted 1 bushel of beans on 2 acres. Drilled them in rows twenty-four inches apart, using a grain drill, and cultivated them with a one-horse cultivator. On the richer part of the field the beans grew to a height of 3½ feet. Yield, 22.50 bushels per acre.

SUMMARY

Of the thirty-two tests reported, eight are, or would be, classed by those who conducted them as failures. These failures were due in most instances to deep planting; to heavy rains after planting, making a crust through which the beans could not make their way, or washing the beans out; to cold, wet weather after planting, which caused the beans to rot; and to drowning out during the growing season.

The successful crops range in yield from 8 to 28 bushels per acre on areas of one or more acres. Some of the plot yields reach 50 bushels per acre.

The date of planting ranges from May 20 to June 21. Some of the best yielding crops were planted about the middle of June.

The common grain drill was, as a rule, used for planting, the rows ranging from twenty-one to forty-two inches apart. The best yields came from rows twenty-one to twenty-eight inches apart.

The amount of seed used varied from two to eight pecks per acre, the maximum acre-yield being secured from about three pecks of seed.

The cultivation consisted, for the most part, of the use of the weeder once before the beans came up and about three cultivations afterward, with one or two-horse cultivators.

The mowing machine with side-delivery attachment was the favorite implement for harvesting.

The threshing was very generally done with the common grain separator, using blank concaves. Several report a good many split beans. (The secret of avoiding the splitting of beans in threshing is in the use of special pulleys to reduce the speed of the cylinder without slowing down the balance of the separator.)

It has remained for a Williams county man to utilize the manure spreader as a bean thresher! The ease with which soybeans part company with the straw makes this method seem quite feasible for small lots of beans.

As a whole, this cooperative work shows that the careful farmer can grow soybeans successfully without previous experience and can handle them with the implements found on most farms. Where some have failed, others, under much the same natural conditions, have succeeded. Those who failed the first trial will doubtless succeed with a second attempt.

In some instances, nodules were found on the roots of the plants without inoculation, but, as a rule, no inoculation, no nodules. For the sake of inoculation it will be well to plant soybeans two years in succession on the same ground.

The early variety of cowpeas—the New Era—sent out with the small plot test of soybeans was a failure in nearly every instance.

The Ohio Station has no soybeans to sell this year (1913), but will be glad to furnish farmers who desire to conduct a small plot test and will report results to the Station, seed of 4 to 6 promising varieties free f. o. b. Wooster. The size of the plots will be one-eightieth of an acre—a size which can be conveniently threshed by hand.

TABLE VIII. COMPOSITION, DIGESTIBLE NUTRIENTS AND FERTILIZING ELEMENTS IN 100 POUNDS OF:—

Name of feed	Total nutrients						Digestible nutrients				Fertilizing elements		
	Water	Ash	Protein	Fiber	Nitrogen free extract	Fat	Protein	Carbohydrates	Fat	Nutritive ratio	Nitrogen	Phosphoric acid	Potash
Soybean silage	74.2	2.8	4.1	9.7	6.9	2.2	2.7	8.7	1.3	1: 4.4	0.71	0.16	0.75
Cowpea silage	79.3	2.9	2.7	6.0	7.6	1.5	1.5	8.6	0.9	1: 7.2	0.43	0.15	0.46
Corn silage	74.4	1.5	2.2	5.8	15.0	1.1	1.1	13.9	0.9	1:14.7	0.35	0.11	0.37
Soybean hay	11.3	7.2	15.4	22.3	38.6	5.2	10.8	38.7	1.5	1: 3.9	2.32	0.67	1.08
Cowpea hay	10.5	14.2	8.9	21.2	42.6	2.6	5.8	39.3	1.3	1: 7.3	1.43	0.52	1.47
Clover hay	15.3	6.2	12.3	24.8	38.1	3.3	6.8	35.8	1.7	1: 5.9	2.07	0.38	2.20
Alfalfa hay	8.4	7.4	14.3	25 1	42.7	2.2	11.0	39.6	1.2	1: 3.9	2.19	0.51	1.68
Timothy hay	15.0	4.5	6.0	29.6	41.9	3.0	2.8	43.4	1.4	1:16.7	1.26	0.53	0.90
Soybeans (grain)	8.7	5.4	36.3	3.9	27.7	18.0	31.5	22.3	15.3	1: 1.9	5.30	1.87	1.99
Cowpeas (grain)	14.6	3.2	20.5	3.9	56.3	1.5	16.8	54.9	1.1	1: 3.4	3.28	1.01	1.20
Corn (grain)	10.6	1.5	10.8	2.2	70.4	5.0	7.9	66.7	4.3	1: 9.7	1.82	0.70	0.40
Oats (grain)	11.0	3.0	11.8	9.5	59.7	5.0	9.2	47.3	4.2	1: 6.2	1.88	0.82	0.62
Oil meal (O. P.)	9.2	5.7	32.9	8.9	35.4	7.9	29.3	32.7	7.0	1: 1.7	5.43	1 66	1.37
Cottonseed meal	7.0	6.6	45.3	6.3	24.6	10.2	37.6	21.4	9.6	1: 1.2	7.25	3.04	1.58
Wheat bran	11.9	5.8	15.4	9.0	53.9	4.0	12.2	39.2	2.7	1: 3.7	2.67	2.89	1.61

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